

ABSTRACT OF THE DISCLOSURE

An acid copper plating solution and plating method are disclosed. The acid copper plating solution comprises copper ions, an organic acid or an inorganic acid, chloride ions, high molecular weight surfactant which controls the electrodeposition reaction, and a sulfur-containing saturated organic compound which promotes the electrocoating rate, wherein the high molecular weight surfactant comprises two or more types with different hydrophobicities. The plating method is a method for forming a plating film on a conductor layer, which is formed on at least a part of a structural object having a concave-convex pattern on a semiconductor substrate, and comprises providing a cathode potential to the conductor layer and supplying a plating solution which electrically connects an anode with the conductor layer, wherein the plating solution contains 25-75 g/l of copper ion and 0.4 mol/l of an organic acid or inorganic acid and an electric resistor is installed between the conductor layer and the anode. Also disclosed is a plating method for forming a wiring circuit on an electronic circuit substrate having fine holes and trenches, comprising forming a plating film on a conductor layer, which is formed on at least a part of the substrate, and filling the holes and trenches with copper, wherein the plating film is formed by using an acid copper plating solution containing copper ions, organic or inorganic acid, chloride ions, sulfur-containing saturated organic compound, and high

molecular weight surfactant controlling electrocoating at a concentration of 500 ppm or more.

The acid copper plating solution and the plating methods are extremely useful as a technology for plating the surface of wafers, which are semiconductor materials, particularly for forming circuit patterns having submicron-level trenches on electronic circuit substrates such as wafers, semi-conductor substrates, or printed boards by using metal plating such as copper plating and can therefore be used with advantage for manufacturing next generation electronic circuit boards with an increasing density of wiring circuits.